

Progress with the Unit 3 Reactor Building Internal Investigation

May 30, 2024

TEPCO

Tokyo Electric Power Company Holdings, Inc.

1. Overview

- We continue initiatives to shed light on how the accident unfolded in the form of “Evaluation of the situation of cores and containment vessels of Fukushima Daiichi Nuclear Power Station Unit 1 to 3 and examination into unsolved issues in the accident progression”.
- In order to obtain information contributing to the planning of the investigation of the reactor building (R/B) in the future, as part of these initiatives, **we ascertained current conditions, such as dose rates and spatial information within the Unit 3 reactor building (for accessibility, etc.), within the scope possible.** (Investigation period: April 16~middle of June 2024)
- **Elevated work platform trucks and four-legged robot (SPOT) that can be operated remotely were used to insert investigation instruments.**
- **γ imagers, three-dimensional laser scanners and dosimeters, etc. were used as investigation instruments.**
- This report will focus on information obtained about the conditions inside the reactor building and a dose distribution data.



○ Elevated work platform truck
Equipped a platform to carry the γ imager/
FirstLook/ SPOT to each floor



○ SPOT
Equipped with cameras/dosimeter/point cloud data gatherers, this robot was inserted on 2nd and 3rd floors to investigate



○ γ imager
Used to analyze γ ray distribution by combining hot spot identification functions with point cloud data acquisition functions



○ Platform for mounting FirstLook/ SPOT



○ FirstLook
Equipped with cameras and radio relays, this will be moved between 2nd and 3rd floors

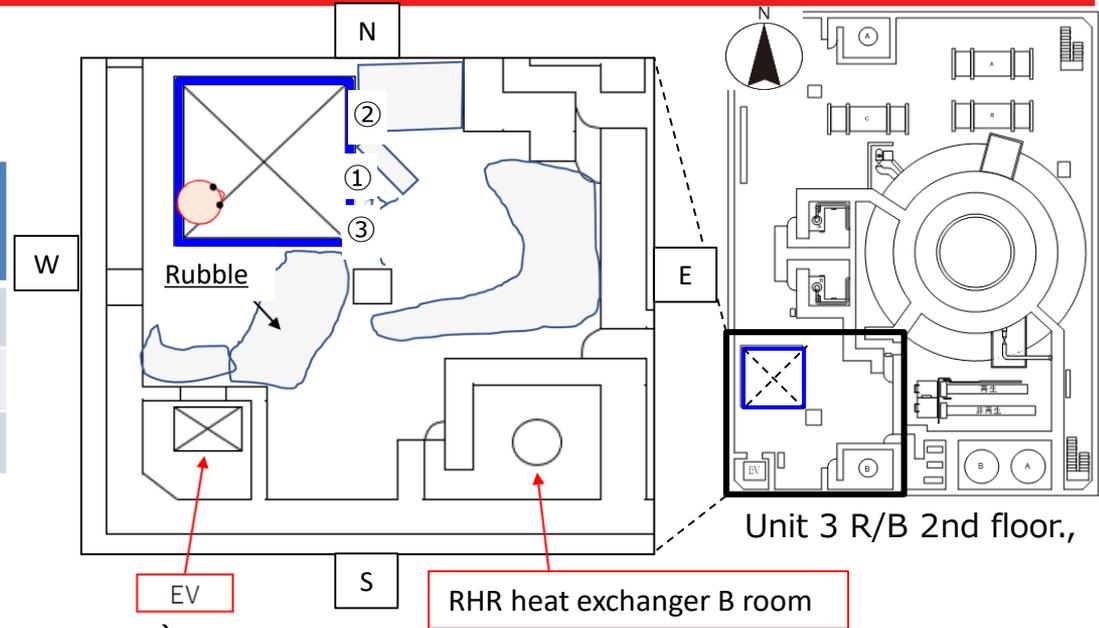


○ Three-dimensional laser scanner
Laser scanner used to obtain precise point cloud data

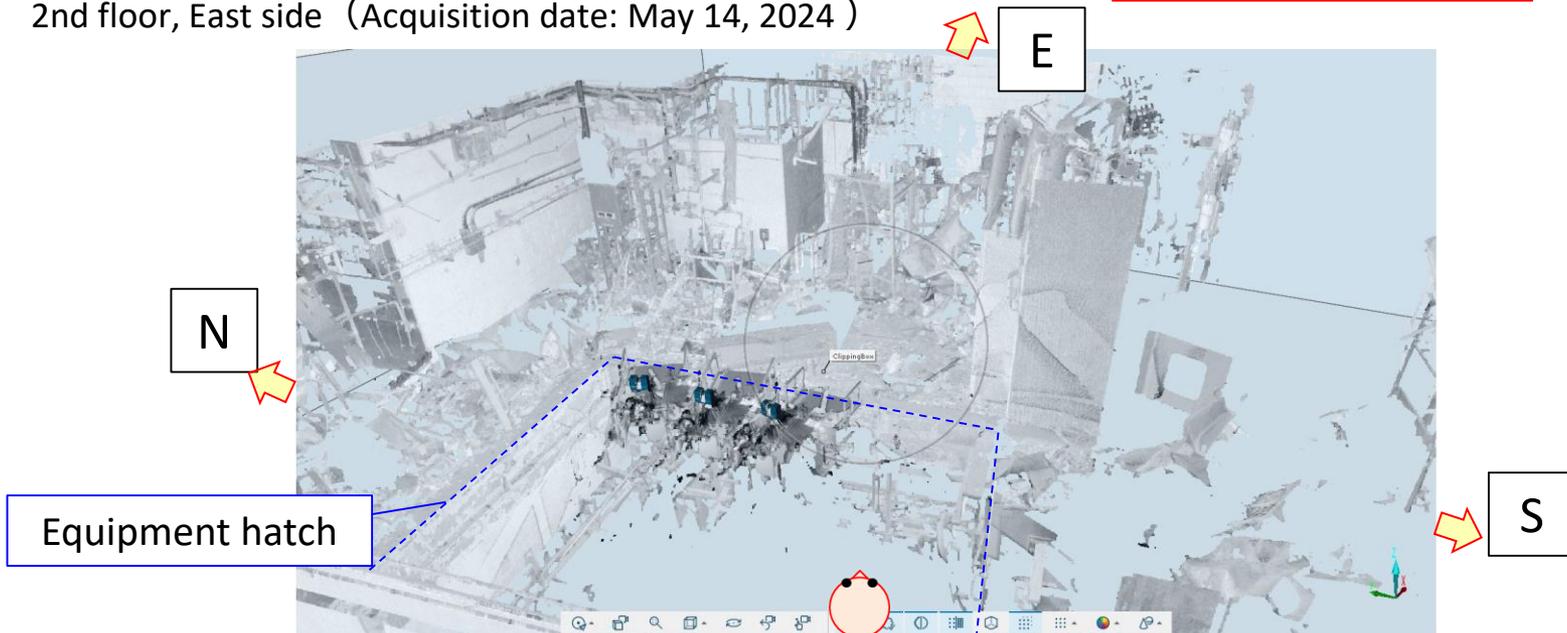
2. Unit 3 R/B 2nd floor investigation results (1/2)

- Air dose rate inside the building
 - 2nd floor, East side
(Measurement date: May 13, 2024)

Measurement location	Height of measurement ※Based on elevation of 2nd floor (T.P.17264)	Dose rate [mSv/h]
①	Approx.850mm	4.64
②		4.75
③		4.60

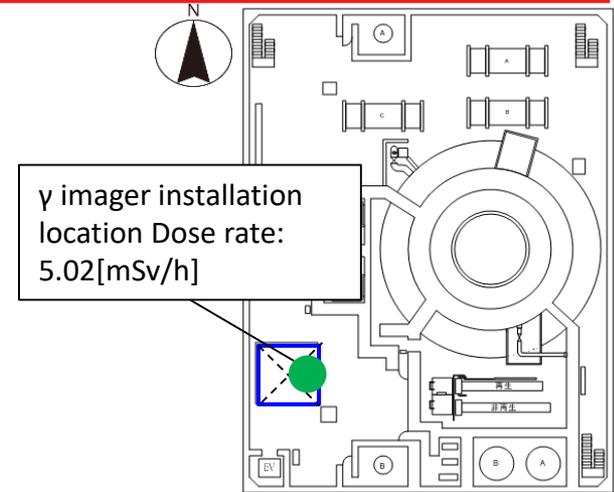


- Point cloud data
 - 2nd floor, East side (Acquisition date: May 14, 2024)



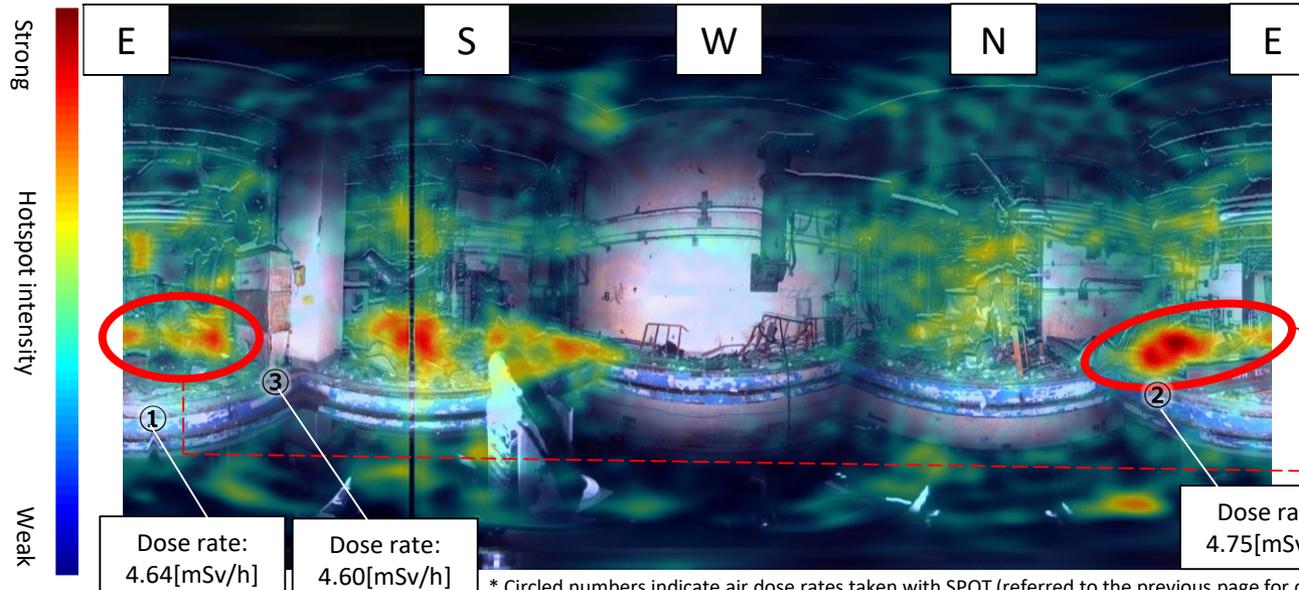
2. Unit 3 R/B 2nd floor investigation results (2/2)

- γ ray distribution by γ imager measurement
- On the 2nd floor, it was confirmed that the hot spot was around the rubble near the floor.



Unit 3 R/B 2nd floor,

- : Equipment hatch position
- : γ imager installation location (Mounted on elevated work platform truck)



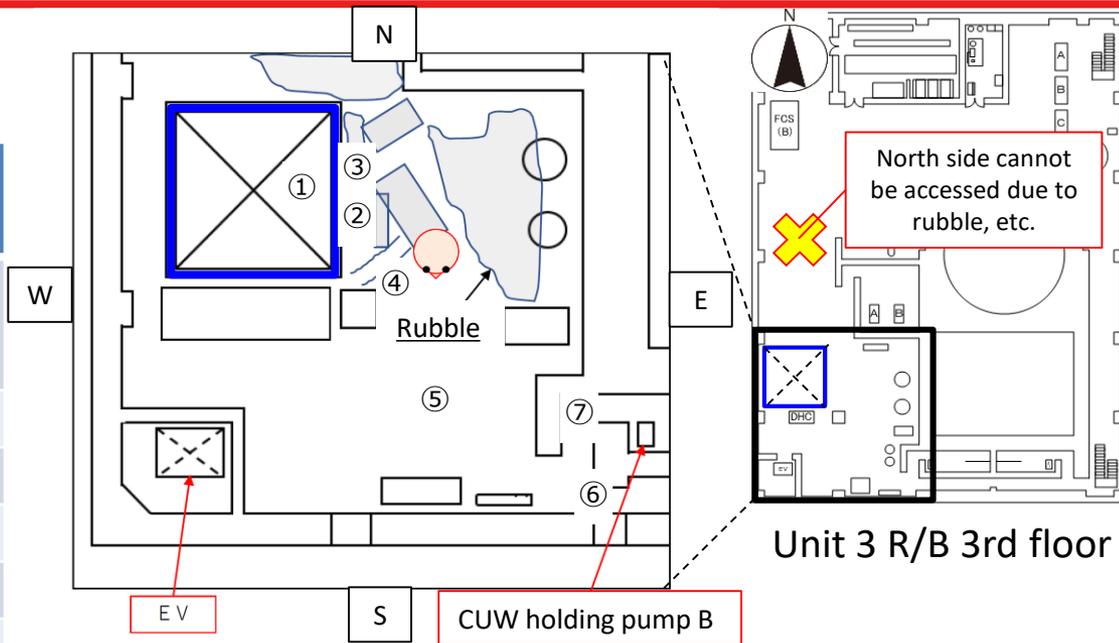
Photographed on April 16, 2024
 γ imager measurement date:
 April 17, 2024

* Relative display of temperature distribution up to 10% of the maximum value (blue) based on the maximum value (red) of the radiation source intensity in the image

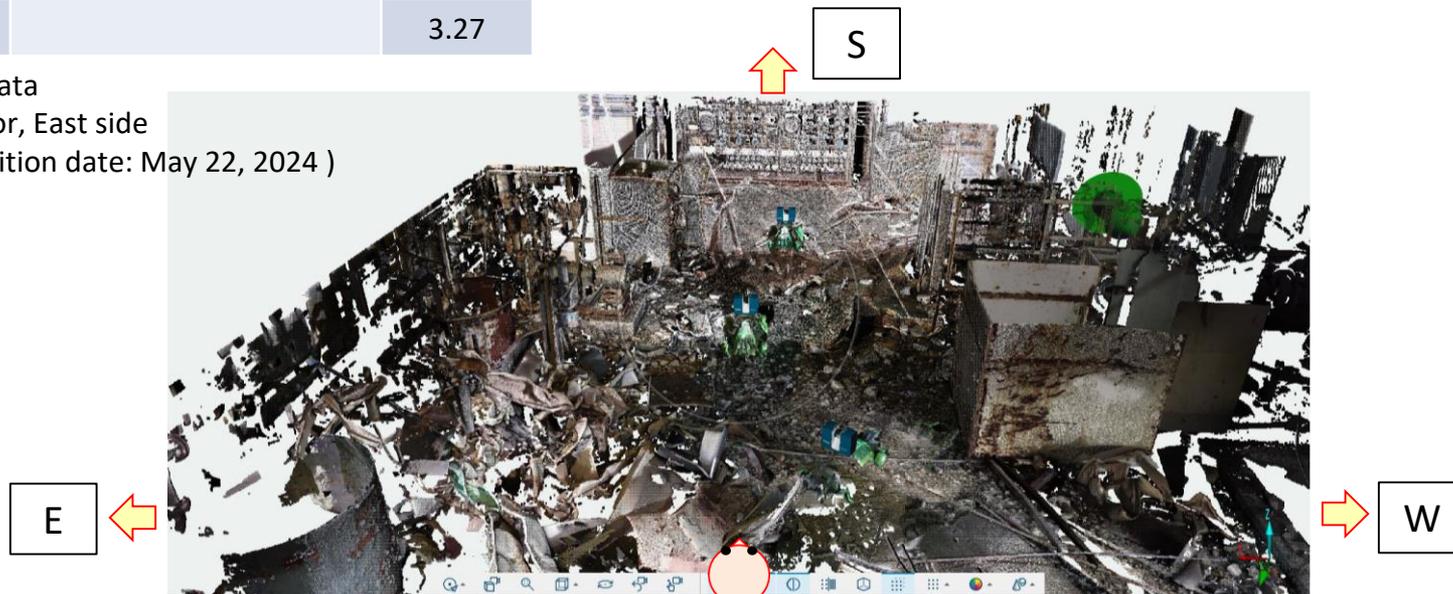
3. Unit 3 R/B 3rd floor investigation results (1/2)

- Air dose rate inside the building
 - 3rd floor, East side
(Measurement date: May 21, 2024)

Measurement location	Height of measurement ※Based on elevation of third floor (T.P.25464)	Dose rate [mSv/h]
①	Approx.650mm ※Mounted on elevated work platform truck	8.21
②	Approx.750mm	10.2
③		10.1
④		12.7
⑤		14.4
⑥		4.75
⑦		3.27

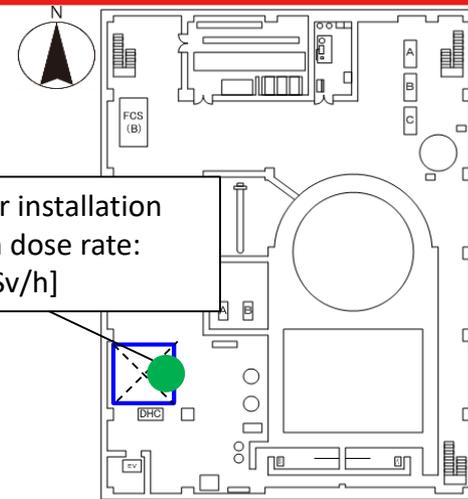


- Point data
 - 3rd floor, East side
(Acquisition date: May 22, 2024)



3. Unit 3 R/B 3rd floor investigation results (2/2)

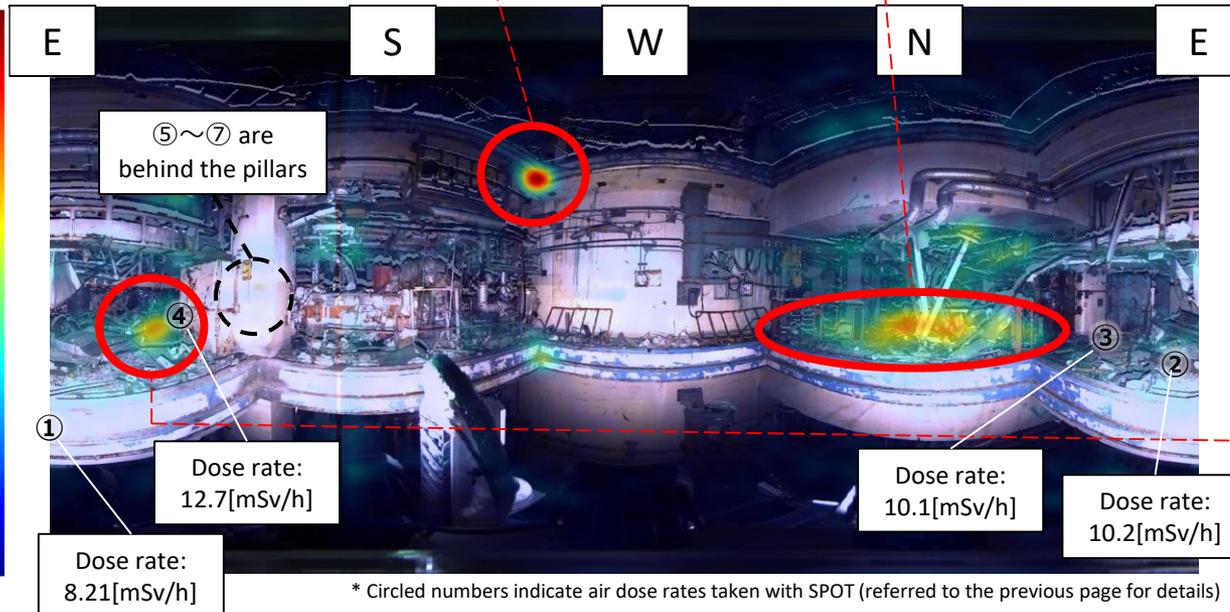
- γ ray distribution by γ imager measurement
- On the 3rd floor, it was confirmed that the hot spot was around the edge of the top of the equipment hatch and around the rubble near the floor.



γ imager installation location dose rate: 7.89[mSv/h]

Unit 3 R/B 3rd floor

- : Equipment hatch position
- : γ imager installation location (Mounted on elevated work platform truck)



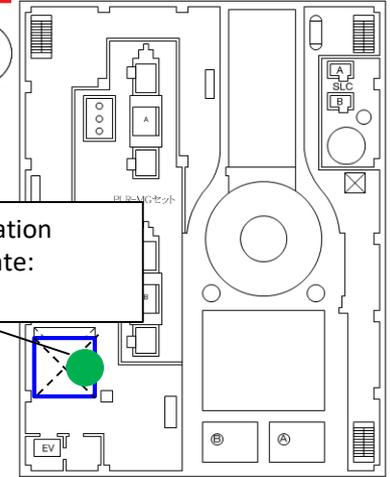
Photographed on April 18, 2024
 γ imager measurement date:
 April 18, 2024

* Circled numbers indicate air dose rates taken with SPOT (referred to the previous page for details)

* Relative display of temperature distribution up to 10% of the maximum value (blue) based on the maximum value (red) of the radiation source intensity in the image

4. Unit 3 R/B 4th floor Investigation results

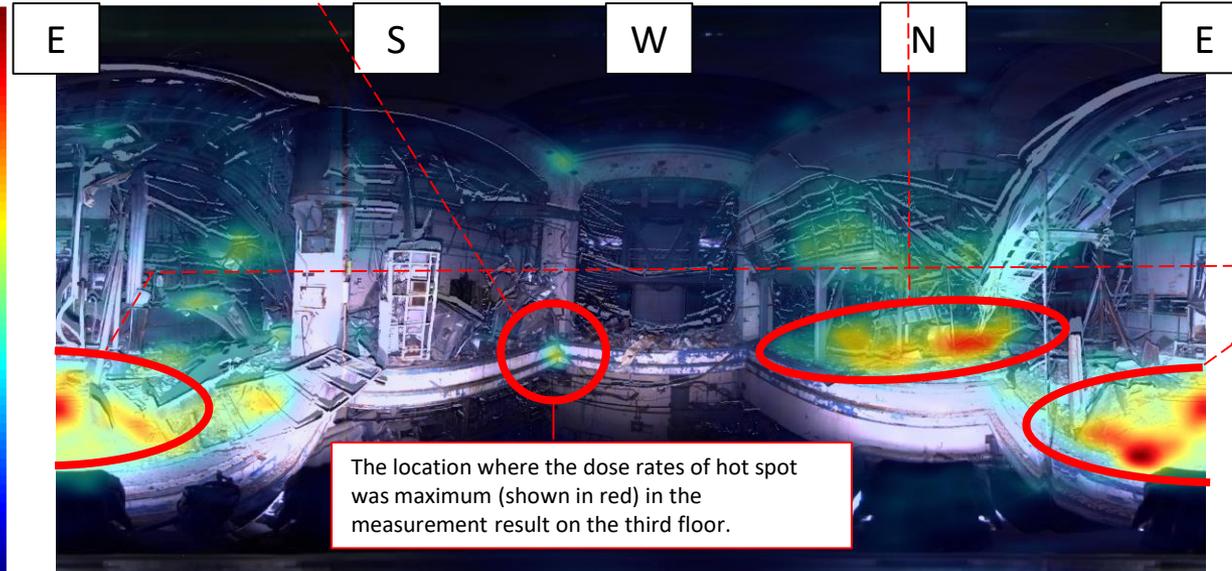
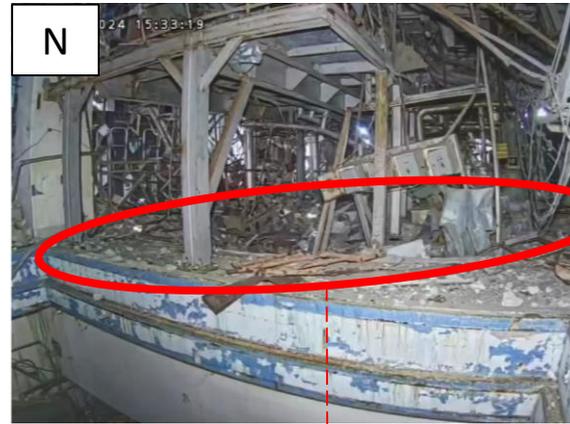
- γ ray distribution by γ imager measurement
 - On the 4th floor, it was confirmed that the hot spot was around the rubble near the floor.
 - Since the intensity of the hot spot on the 3rd floor are relatively weak, it is assumed that dose rates on the 4th floor are higher.



γ imager installation location dose rate: 19.1[mSv/h]

Unit 3 R/B 4th floor

- : Equipment hatch position
- : γ imager installation location (Mounted on elevated work platform truck)



Photographed on April 19, 2024
 γ imager measurement date: April 19, 2024

* Relative display of temperature distribution up to 10% of the maximum value (blue) based on the maximum value (red) of the radiation source intensity in the image

5. Utilizing acquired data

- Video footage (used to ascertain accessible spaces, the position of rubble, and condition of damage)
 - Recording traces of the accident
 - Deliberating rubble removal and decommissioning task-related equipment installation, etc.
 - Drafting investigation plans for areas not yet investigated

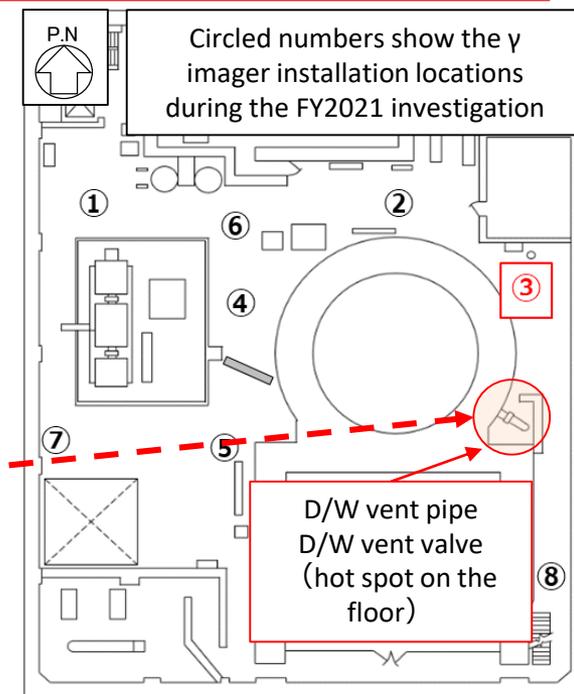
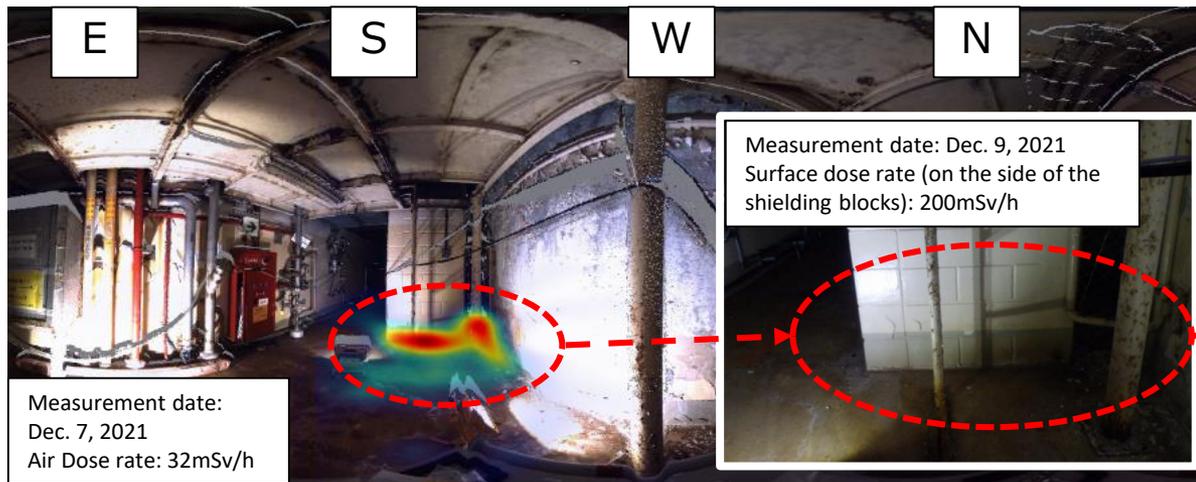
- Point cloud data (used to quantitatively ascertain accessible spaces, the position of rubble, and condition of damage)
 - Recording traces of the accident
 - Deliberating rubble removal and decommissioning task-related equipment installation, etc.
 - Drafting investigation plans for areas not yet investigated

- Dose rate data (use to ascertain on-site air dose rates and high dose rate locations)
 - Deliberating exposure doses during future on-site work
 - Deliberating highly radioactive equipment and rubble removal for reducing dose rates on-site

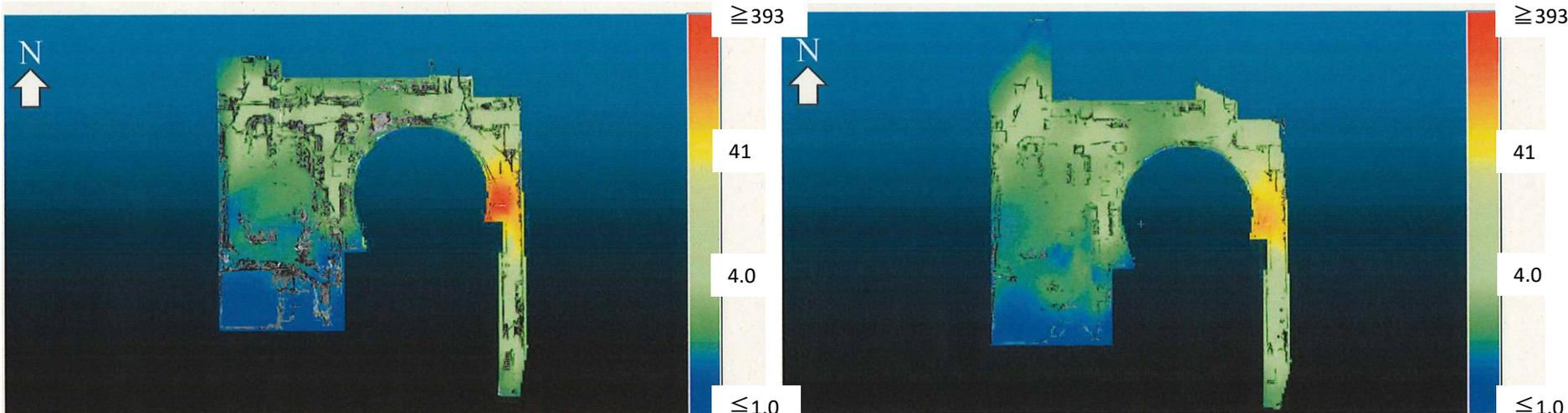
- γ imager measurement results (Used to estimate hot spot intensity distribution)
 - Identify hot spot within the scope of measurement and estimate dose rate distribution
 - Assessment results used in the same manner as dose rate data

(Reference) Example of dose rate distribution estimate based on γ imager measurements

- Dose rate distribution estimate from γ imager measurement data (example)
(Example: Unit 1 R/B 3rd floor (FY2021 investigation))



Result of γ imager measurements for location ③ on the 3rd floor of the Unit 1 R/B



Unit 1 R/B 3rd floor: Dose redistribution 0.20m above the floor [mSv/h]

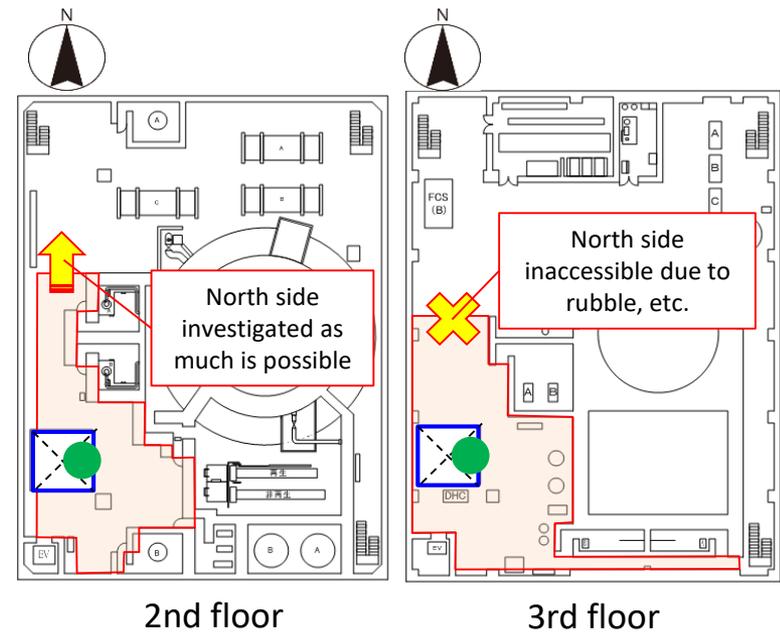
Unit 1 R/B 3rd floor: Dose rate distribution 1.5m above the floor [mSv/h] 8

- A remotely operated robot was used in the southwest area of the Unit 3 R/B in order to obtain data (video footage, point cloud data and dose rate data) about traces of the accident left there.
- Confirmed the main hot spot on 2nd~4th floors were around rubble near the floor.
- The obtained data will be used to identify hot spot in the aforementioned area and estimate dose rate distribution.
- The information acquired during this investigation will also be used for future decommissioning works (to deliberate dose reduction measures through rubble removal and the installation of decommissioning task-related equipment, etc.) and to draft investigation plans for areas not yet investigated.

[Reference] Investigation overview

- Investigation method
 - Cameras, dosimeters, γ imagers, and point cloud data acquisition equipment used to acquire information about open spaces inside the R/B (ability, etc.), and dose rate data.
 - Investigation was carried out by installing an investigation instrument on a remotely operated robot.
 - An elevated work platform truck was used to insert investigation equipment onto each floor through equipment hatches on the southwest side of the R/B.

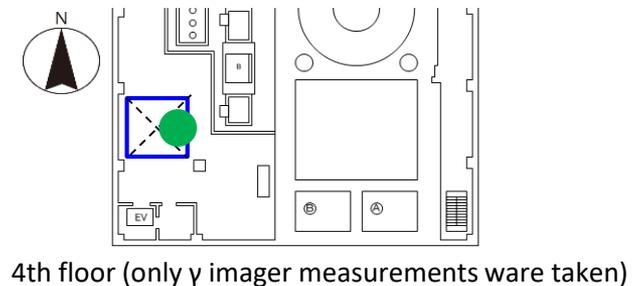
- Investigation scope
 - The investigation focused on the areas around the equipment hatches on the south side of 2nd~4th floors (refer to the maps on the right).
 - Only γ imager measurements were taken on the 4th floor (The arm extension limitations of the elevated work platform truck made it difficult to insert the robot on the 4th floor).
 - Main points of the investigation show below.



2nd floor

3rd floor

Main points	Investigation method	Video footage	Dose rate measurements	γ imager measurements	Point cloud data
Accessibility of each floor		○			○
Rubble conditions		○			○
Building damage		○			○
Dose rate distribution			○	○	
Hot spot conditions		○	○	○	○



4th floor (only γ imager measurements were taken)

- : Equipment hatch position
- : Scope of remotely operated robot investigation (Varies depending on the rubble conditions and real communication conditions)
- : γ imager installation location (mounted on elevated work platform truck)

- Investigation period (plan)
 - April-June 2024